

Application No. 10/506,556
Reply to Office Action of April 4, 2006

Amendments to and listing of the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

1. (Currently Amended) A magnetic detection device comprising:
a first magnetic core of a soft magnetic film,
a conductive wire formed on said first magnetic core at a portion thereof, and
a second magnetic core of a soft magnetic film formed on said first magnetic core
so as to hold said conductive wire therebetween, the area of the cross-section perpendicular to a
magnetic path being partially different, ~~therein~~
wherein a current in which a DC bias current is superimposed on an AC current is
let to flow through said conductive wire.

2. (Currently Amended) A magnetic detection device comprising:
a first magnetic core of a soft magnetic film, the area of the cross-section
perpendicular to a magnetic path being partially different,
a conductive wire formed on said first magnetic core at a portion thereof, and
a second magnetic core of a soft magnetic film formed on said first magnetic core
so as to hold said conductive wire therebetween, the area of the cross-section perpendicular to a
magnetic path being made smaller in the vicinities of the fringe portions of said conductive wire
than that of the other portion, ~~therein~~
wherein a current in which a DC bias current is superimposed on an AC current is
let to flow through said conductive wire.

3. (Currently Amended) A magnetic detection device comprising:
a first magnetic core of a soft magnetic film,
a conductive wire formed on said first magnetic core at a portion thereof, and
a second magnetic core of a soft magnetic film formed on said first magnetic core
so as to hold said conductive wire therebetween, the thickness of said second magnetic core

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being smaller than that of said first magnetic core, ~~therein~~

wherein a current in which a DC bias current is superimposed on an AC current is let to flow through said conductive wire.

4. (Currently Amended) A magnetic detection device comprising:
 a first magnetic core of a soft magnetic film,
 a conductive wire formed on said first magnetic core at a portion thereof, and
 a second magnetic core of a soft magnetic film formed on said first magnetic core so as to hold said conductive wire therebetween, the thickness of said second magnetic core being larger than that of said first soft magnetic core, ~~therein~~
 wherein a current in which a DC bias current is superimposed on an AC current is let to flow through said conductive wire.

5. (Previously Presented) A magnetic detection device in accordance with claim 1, wherein the width of at least one of said first and second magnetic cores is made smaller in the vicinity of said conductive wire.

6. (Previously Presented) A magnetic detection device in accordance with claim 1, wherein said second magnetic core has a depressed portion or a hole in a region including said conductive wire to decrease the area of the cross-section perpendicular to a magnetic path of said second magnetic core.

7. (Previously Presented) A magnetic detection device in accordance with claim 1, wherein said conductive wire is held between said first and second magnetic cores via insulation films.

8. (Previously Presented) A magnetic detection device in accordance with claim 1, wherein the ratio of the small portion and the large portion of the partially different cross-

sectional areas of said first magnetic core and said second magnetic core is 3 to 4 or less.

9. (Previously Presented) A magnetic detection device in accordance with claim 1, wherein the thickness of at least one of said first and second magnetic cores is made smaller in the vicinity of said conductive wire.

10. (Previously Presented) A magnetic detection device in accordance with claim 1, wherein the thickness of said conductive wire in the vicinities of the fringe portions thereof is made smaller.

11. (Previously Presented) A magnetic detection device in accordance with claim 1, wherein the thickness of at least one of said first and second magnetic cores in a region thereof including said conductive wire is partially made smaller.

12. (Previously Presented) A magnetic detection device in accordance with claim 1, wherein grooves are formed so that the area of the cross-section perpendicular to a magnetic path of said second magnetic core at the circumference of said conductive wire is made smaller than that at the other portion.

13. (Previously Presented) A magnetic detection device in accordance with claim 1, wherein said first magnetic core and said second magnetic core are insulated by an insulation layer in a region including said conductive wire.

14. (Previously Presented) A magnetic detection device in accordance with claim 1, wherein the end regions of said first magnetic core have a two-layer structure.

15. (Previously Presented) A magnetic detection device in accordance with claim 1, wherein the thickness of said conductive wire is larger than the thickness of one of said first

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magnetic core and said second magnetic core.

16. (Original) A magnetic detection device in accordance with claim 15, wherein the thickness of said conductive wire is larger than the thickness of said second magnetic core.

17. (Previously Presented) A magnetic detection device in accordance with claim 15, wherein the ratio (thickness/length) of the thickness of said conductive wire to the length thereof in a direction parallel with the direction of a magnetic field to be detected is 1/4 or more.

18-32. (Canceled)

33. (Currently Amended) A magnetic detection device comprising:
a first magnetic core of a soft magnetic film having a nearly rectangular shape and formed on a nonmagnetic substrate,

a plurality of first conductive wires formed on said first magnetic core at predetermined intervals in a direction perpendicular to the longitudinal direction of said rectangular first magnetic core,

a second magnetic core of a soft magnetic film formed on said first magnetic core so as to hold said first conductive wires therebetween, the area of the cross-section perpendicular to a magnetic path being partially different, and

a plurality of second conductive wires for connecting said plurality of first conductive wires in series, ~~therein~~

wherein a current in which a DC bias current is superimposed on an AC current is let to flow through said conductive wires.

34. (Currently Amended) A magnetic detection device in accordance with claim

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33, comprising a plurality of magnetic detection devices, each comprising:

 a first magnetic core of a soft magnetic film having a nearly rectangular shape and formed on a nonmagnetic substrate,

 a plurality of first conductive wires formed on said first magnetic core at predetermined intervals in a direction perpendicular to the longitudinal direction of said rectangular first magnetic core,

 a second magnetic core formed on said first magnetic core so as to hold said first conductive wires therebetween, the area of the cross-section perpendicular to a magnetic path of said second magnetic core being partially different, and

 a plurality of second conductive wires for connecting said plurality of first conductive wires in series, therein

wherein said plurality of magnetic detection devices are arranged in parallel with said longitudinal direction, and said first and second conductive wires of the respective detection devices are all connected in series.

35. (Currently Amended) A magnetic detection device comprising:

 a plurality of first magnetic cores having a nearly rectangular shape and formed in parallel on a nonmagnetic substrate,

 a plurality of first conductive wires formed on said plurality of first magnetic cores at predetermined intervals in a direction perpendicular to the longitudinal direction of said plurality of first magnetic cores,

 second magnetic cores formed on said plurality of first magnetic cores so as to hold said first conductive wires therebetween, the areas of the cross-sections perpendicular to magnetic paths being partially different, and

 second conductive wires for connecting all of said plurality of first conductive wires in series, therein

wherein a current in which a DC bias current is superimposed on an AC current is let to flow through said conductive wires.

36. (Original) A magnetic detection device in accordance with claim 35, wherein the thicknesses of said second magnetic cores in the vicinities of said first conductive wires are made smaller.

37. (Original) A magnetic detection device in accordance with claim 35, wherein among said plurality of first and second magnetic cores having a nearly rectangular shape and formed in parallel on said nonmagnetic substrate, those disposed at both end portions are made shorter than those disposed at the central portion.

38. (Previously Presented) A magnetic detection device in accordance with claim 33, wherein said second conductive wires are conductive films formed on said second magnetic core.

39. (Previously Presented) A magnetic detection device in accordance with claim 33, wherein insulation films are provided between said first magnetic core and said first conductive wire, between said first conductive wire and said second magnetic core and between said second magnetic core and said second conductive wire.

40-41. (Canceled)